CONNECTORS AND RAILING SYSTEM HAVING METAL BALUSTERS ISOLATED FROM CORROSION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to connectors for use in forming railings made with treated lumber and tubular metal balusters wherein the balusters are isolated from corrosion by the lumber.

2. Brief Description of the Prior Art

It has been found that an attractive fence or railing resembling a wrought iron fence can be made with hollow metal balusters mounted in holes drilled in top and bottom wood rails. One such construction is described in U.S. patent No. 6,394,422 to Jones et al. which is incorporated by reference herein.

In recent years there has been a change in the chemicals employed for treating lumber used outside. Arsenic, the primary component used to preserve wood from deterioration, in the form of copper chromated arsenic (CCA), has been banned. Newly developed arsenic free treatments include alkaline copper quaternary (ACQ) and copper azole (CA). These treatments, however, contain approximately six times more copper than CCA.

Galvanic corrosion occurs when dissimilar metals are in contact with each other in the presence of an electrolyte. The increased copper content in new wood preservatives has caused metal balusters when formed of aluminum to corrode, especially at the point of contact with the wood. The problem of corrosion is increased in an outdoor environment where the components are exposed to moisture, i.e., from rain, dew and other sources.

Metal balusters formed of aluminum are painted. It has been found that the alkaline in the ACQ is used as a paint remover. Hence ACQ may be expected to corrode the paint as well as cause galvanic corrosion of the aluminum of metal balusters in contact with wood treated with ACQ.

U.S. patent Nos. 1,797,883, 3,810,341, 4,403,767, 4,886,245, 5,419,538, 5,474,395, 6,126,148, 6,305,670, 6,308,937, 6,311,957, and 6,394,422 are incorporated by reference herein.

BRIEF SUMMARY OF THE INVENTION

In view of the above, it is an object of the present invention to provide a connector for protecting metal balusters from metal or paint corrosion in a railing. It is another object to provide a connector that can be used to easily and rapidly construct horizontal or inclined railings. Other objects and features of the invention will be in part apparent and in part pointed out hereinafter.

A connector for use in isolating painted tubular metal balusters from rails formed of wood treated with a wood preservative that is corrosive to the tubular metal balusters or from a wood preservative that is corrosive to the paint is formed of a chemically inert material and comprises a body and a disk.

The body has an upper frustum with a base and a lower frustum with a base. The upper and lower frustums are joined at their bases and the body is adapted to conform and wedge into an end of a tubular metal baluster. The disk is adapted for placement under the lower frustum and against an end of the tubular metal baluster when the body is wedged into the end of tubular metal baluster. The upper frustum has a central cavity for receipt of a fastener for joining the body and the disk to a wooden rail with the disk acting as a corrosion barrier between the baluster and the wood rail.

The connectors described above may be used to form a railing having a top rail and a bottom rail. The top rail and the bottom rail are spaced apart and formed of wood, the wood treated with a wood preservative. Hollow metal balusters extend between the top and bottom rails, with connectors isolating the tubular metal balusters from the rails.

The invention summarized above comprises the constructions hereinafter described, the scope of the invention being indicated by the subjoined claims.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

In the accompanying drawings, in which several of various possible embodiments of the invention are illustrated, corresponding reference characters refer to corresponding parts throughout the several views of the drawings in which:

Fig. 1 is a perspective view of a connector in accordance with the present invention;

Fig. 2 is a plan view of a disk portion of the connector for use with horizontal rails;

Fig. 3 is a plan view of a disk portion of the connector for use with inclined rails;

Fig. 4 is an exploded perspective view of a railing system in accordance with the present invention;

Fig. 5 is a perspective view of the connector being installed on a rail;

Fig. 6 is a cross-section on enlarged scale taken along the plane of 6-6 in Fig. 5; and,

Fig. 7 is a cross-section similar to Fig. 6 but where the rail is inclined.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings more particularly by reference character starting with Fig. 4, reference numeral 10 refers to a railing in accordance with the present invention. Railing 10 has a horizontal top rail 12 and a horizontal bottom rail 14 with a plurality of balusters 16 placed between top and bottom rails 12, 14.

Balusters 16 may be made from straight sections of round aluminum tubing, but it will be appreciated that they may be made from another material, such as another metal, and may have a different cross-section and/or a more complex shape.

Balusters 16 are installed on rails 12, 14 using connectors 18 of the invention. Connectors 18 are installed on rails 12, 14 using fasteners 20 such as screws, nails or the like. Connectors 18 are installed at appropriate intervals along bottom rail 14 as shown in Fig. 4, and balusters 16 are placed over connectors 18 with connectors 18 snugly received in the bottoms of balusters 16. Connectors 18 are also installed along top rail 12 at matching intervals and top rail 12 lowered to place its connectors snugly into the tops of balusters, as shown.

Turning to Figs. 1-3 and 6-7, connectors 18 include a body 22 and a disk 24 formed of a chemically inert material. Nonconductive ceramics, glass, rubber compounds and plastics may be used. Preferred materials are chemically inert or corrosion resistant polymers such as polyethylenes, polypropylenes, vinyl polymers, polyamide\nylon polymers, polyethers and polyesters, including mixtures and copolymers thereof. These materials are strong, durable and inexpensive and possess the preferred balance of flexibility and rigidity. The flexibility of the elastomer provides sufficient compliance to allow connector 18 to distort to conform to inclined top and bottom rails 12, 14 as shown in Fig. 7 and more discussed below.

With continuing reference to Figs. 1-3 and 6-7, body 22 is a solid shaped with an upper frustum 26 joined to the base of a lower frustum 28. Frustums 26, 28 may be conical, pyramidal, etc. A central ridge 30 may be formed about body 22 where the bases of upper and lower frustums 26, 28 are joined. Additional ridges 32 may be provided above and below central ridge 30 for uses that will become apparent. Body 22 is adapted to conform and wedge into an end 34 of one of tubular metal balusters 16 as best seen in Figs. 6-7. In Fig. 6, body 22 is wedged on at least central ridge 30 when end 34 is square cut for use on horizontal rails 12, 14. When end 34 is angled for use on inclined rails 12, 14 which are installed along steps or ramps, as is known in the art, body 22 may be wedged along

other on other parts of body 22, as shown in Fig. 7. Additional ridges 32 may be useful and may be provided for this purpose. Also as shown in Fig. 7, body 22 may have a central cavity 36 for recessed receipt of fasteners.

Disk 24 is adapted for placement under lower frustum 28 of body 22 and against end 34 of tubular metal baluster 16. When end 23 of tubular metal baluster 16 is square cut for use on horizontal rails 12, 14 as shown in Figs. 4-6, disk 24 is circular and may include a preformed hole 38 through which fastener 20 is received. But when end 34 is angled for use on inclined rails 12, 14 as shown in Fig. 7, disk 24 is oval. In both instances, however, disk 24 forms a barrier between end 34 of tubular metal baluster 16 and the wood rail which may have been treated with a wood preservative such as copper chromated arsenic (CCA), the use of which was banned by the EPA as of December 31, 2003 for pressure treated wood for residential use, alkaline quaternary (ACQ), copper azole (CA) and the like.

As shown in Fig. 5, connector 18 may be readily installed on rails 12, 14 using a power driver 40. Manual drivers such as a screw driver when fastener 20 is a screw, a hammer when fastener 20 is nail and so forth may also be used. In such operations, fastener 20 is received in central cavity 36 and extends through a passageway 42 in lower frustum 28 and through hole 38 in disk 24 which is either preformed or punched by fastener 20. In place, end 34 of tubular metal baluster 16 can be wedged over connector 18 with disk 24 acting as a corrosion barrier by keeping balusters 16 out of contact with rails 12, 14 which may contain a corrosive wood preservative.

While connectors 18 were developed for use with wooden rails treated with preservatives, they may be used with untreated wood such as cedar or with synthetic materials. With these materials, connectors 18 provide for easy assembly of railing 10 without drilling rails 12, 14 to receive balusters 16. This is a significant advantage in the case of synthetic materials which may be soft and weakened by drilling. It will therefore be understood that connecters 18 used with rails 12, 14 which do not corrode painted tubular metal balusters 16 are within the patent claims to the connectors and to the railing system.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained. As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.